Trend Study 30-59-03

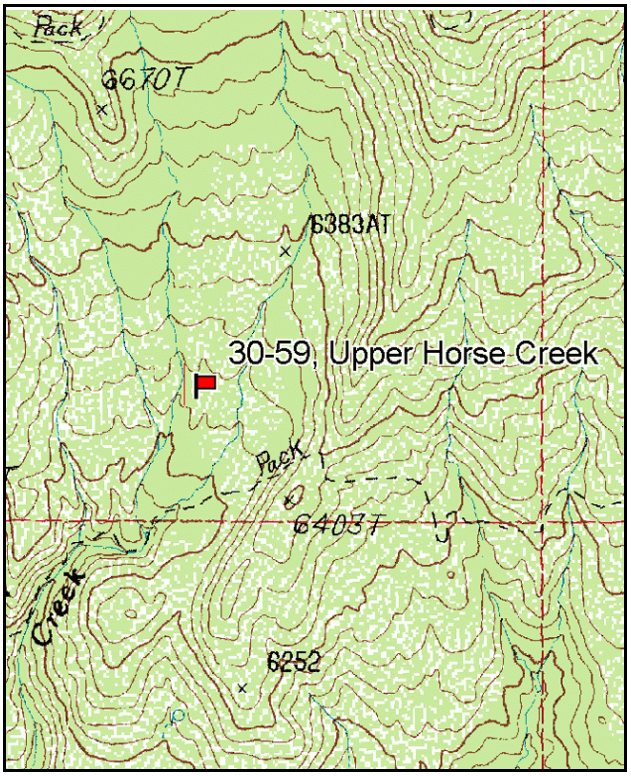
Study site name: Upper Horse Creek . Vegetation type: Burn-Mtn. Brush .

Compass bearing: frequency baseline 210 degrees magnetic. (Line 2 193°, line 3 290°)

Frequency belt placement: line 1 (11 & 95ft), line 2 (34 & 71ft), line 3 (59ft).

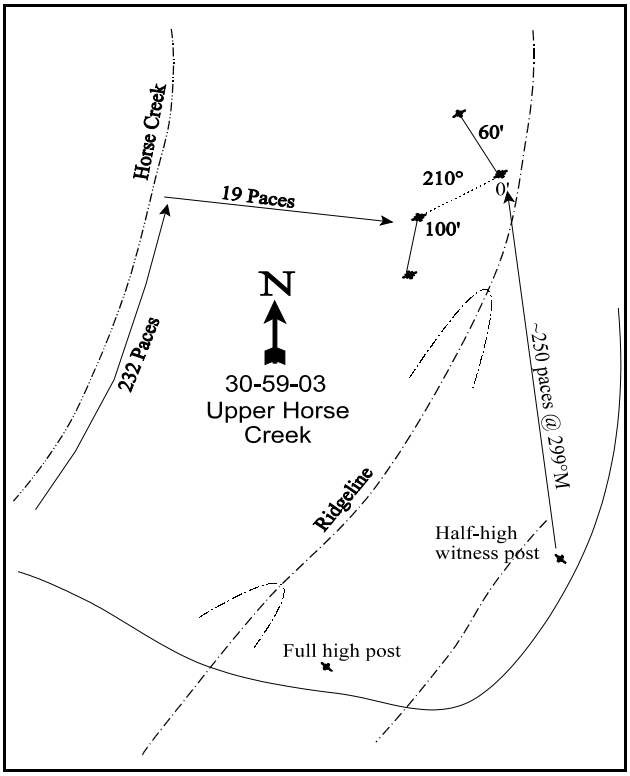
LOCATION DESCRIPTION

From Oak Grove campground travel back down the road about 2.0 miles to the Jones Hollow trail head on the northeast side of the road (it is blocked off by boulders). Park here and hike up the trail about 3/4 of a mile to Spirit Creek. Cross the creek and continue northeast for approximately 1/4 of a mile to horse creek. Follow the trail along the north side of the east fork of Horse Creek upstream to a half-high witness post. Walk approximately 250 paces at 299 degrees magnetic to the base of the ridge where there is a green fence post marking the 0-foot end of the frequency baseline. All transect stakes are 1½ foot tall green steel fence posts. The baseline starts on top of the ridge.



Map Name: Signal Peak

Township 40S , Range 14W , Section 10



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4132877 N, 286202 E

DISCUSSION

Upper Horse Creek - Trend Study No. 30-59

The Upper Horse Creek study samples a burned curlleaf mountain mahogany site. Elevation is approximately 6,200 feet with a south aspect and slope of 5% to 8%. The site was previously dominated by large mature curlleaf mountain mahogany trees with an oak understory. A wildfire burned the area in June of 1986 which killed all the mahogany. Deer use this area in the summer and sometimes year-long during mild winters. Nearby Horse Creek provides year-round water. Pellet group data estimate a low level of deer use at 31 deer days use/acre (77 ddu/ha) in 1998 and 20 days use/acre (50 ddu/ha) in 2003.

The soil is moderately deep, but very rocky with abundant rocks on the surface and within the profile. These rocks are large and appear to be granite. Effective rooting depth is estimated at nearly 19 inches. Soil texture is a sandy loam which is moderately acidic in reactivity (pH 6.0). Erosion increased immediately after the fire and continued in 1987. Basal vegetative cover was less than 1% in 1986. Bare ground averaged 19% while the remaining litter had a cover value of 50%. Basal vegetative cover increased to 5% by 1987, but bare ground increased to 45% and litter declined to 21%. Soil movement, active gullies, and other signs of erosion were reported during both years. By 1992, conditions had improved. Basal vegetative cover increased to 14%, litter increased to 48%, and bare ground declined to 12%. No signs of erosion were noticeable. During the 1998 reading, conditions continued to improve slightly with percent bare ground declining slightly. Litter cover increased from 48% to 57% and rock cover declined from 25% to 16%. There are currently no signs of erosion on the site, although there is a gully nearby which shows some signs of activity during high runoff events.

Curlleaf mountain mahogany was eliminated after the fire, but Utah serviceberry, Gambel oak, and a Gambel-shrub live oak hybrid, sprouted profusely. During the 1986 reading, there were an estimated 2,600 serviceberry and 3,499 oak seedlings per acre. The only other browse found included a small number of yellowleaf silktassel seedlings and an unidentified browse. By 1987, serviceberry density increased to 4,333 young and 400 seedlings per acre. Oak densities declined to 1,532 young and seedlings per acre. Desert ceanothus was encountered in 1987 with an estimated density of 600 plants/acre. Between 1987 and 1992, serviceberry densities declined by 54% to 1,999 plants/acre. Gambel oak declined from 833 to 166 plants/acre, while the oak hybrid decreased from 533 to 433 plants/acre. Reproductive potentials of all species declined. Desert ceanothus density remained fairly constant with an estimate of 566 plants/acre. A much larger sample was used in 1998 which better estimates shrub populations which often have discontinuous and/or aggregated distributions. As a result, some of the population changes may be due to the change in sample size. Density of serviceberry was estimated at 560 plants/acre. Density of desert ceanothus also declined from 566 to 180 plants/acre. Since there are no dead or decadent plants for either species, the change in density is due to the increased sample size. More Gambel oak was encountered in the larger sample. Density increased 93%, from 166 to 2,320 plants/acre. Mature plants averaging nearly 4 feet in height represented 68% of the population. No seedlings were encountered, yet young plants were fairly abundant. Data from 2003 show a stable strip frequency for Gambel oakbrush, while average cover increased from 7% to 10%. Serviceberry density has remained stable. Utilization of serviceberry was moderate in 1987 and 1992, yet browsing on oak has been light. Utilization of browse was mostly light in 1998, but some moderate and heavy use was noted on serviceberry and desert ceanothus. Most shrubs were only lightly browsed in 2003.

During the first reading in September of 1986, no perennial grasses were encountered, while only two forbs were found. Since then, seeded exotic grasses consisting of crested and intermediate wheatgrass, smooth brome, and alfalfa have dominated the understory and provide competition to shrub recruitment. However, shrubs are not as important as grasses and forbs on summer range. Cheatgrass brome is also well established. It provided 28% of the grass cover in 1998 and 22% in 2003. The forb component is diverse but dominated

by alfalfa which provided 76% of the forb cover in 1998. Alfalfa was heavily utilized in 1992, but appeared unutilized in 1998 and 2003. The only other fairly common forbs include wormwood and globemallow.

1992 TREND ASSESSMENT

Soil conditions have improved since 1986 and 1987. Basal vegetative cover has increased from 5% to 14% by 1992. Litter cover has increased to 48%, while bare ground has declined to only 12%. Key browse species increased dramatically after the burn, then declined in density between 1987 and 1992. All species currently display reduced reproductive potentials. It appears that competition from the herbaceous understory and the moderate to heavy wildlife use are effectively controlling shrub recruitment. But again, shrubs are not as important on this summer range. Trend for browse is slightly down since 1987. Seeded exotic grasses, crested wheatgrass, intermediate wheatgrass, and the seeded forb alfalfa dominate the site. Nested frequencies of these plants have increased steadily since the fire. On the downside, cheatgrass brome is also well established. Overall, trend for herbaceous understory is up.

TREND ASSESSMENT
soil - up (5)
browse - slightly down (2)
herbaceous understory - up (5)

1998 TREND ASSESSMENT

Trend for soil is up slightly with a slight decline in percent bare ground and an increase in litter cover from 48% to 57%. Currently, there is no problem with erosion on the site. Trend for browse appears stable. The changes in density appear to be due to the much larger sample size. Use of the browse is mostly light and recruitment adequate to maintain populations at current levels. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency for perennial grasses and forbs. Nested frequency of smooth brome increased significantly, while frequency of crested wheatgrass and intermediate wheatgrass remained similar. Eleven new perennial forb species were encountered in the new sample. The dominant forb, alfalfa, remained at a similar frequency compared to 1987 and 1992.

TREND ASSESSMENT
soil - up slightly (4)
browse - stable (3)
herbaceous understory - up slightly (4)

2003 TREND ASSESSMENT

Trend for soil is stable. There is abundant protective ground cover in the form of perennial grasses to prevent erosion. Trend for browse is stable. Most shrubs have stable population densities, light use, and normal vigor. Serviceberry is the primary preferred shrub. It has remained stable in density at 540 plants/acre. Use is mostly light and vigor is normal on all but a few of the decadent plants. Average height of mature plants has steadily increased from about 2 feet in 1992 to nearly 4 feet by 2003. Gambel oak cover has increased from 7% to 10% but strip frequency has remained stable. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs has declined slightly. However, the dominant perennial grasses have not declined significantly and average cover of perennial grasses has remained stable at around 16%. The forb composition is diverse but the sum of nested frequency has declined by 26%. However, the most abundant forb, alfalfa, did not decline significantly. Average cover of perennial forbs did decline from 13% to 6%. Drought conditions are obviously effecting the herbaceous species on this site, especially forbs, but not as dramatically at this elevation compared to other sites in the unit.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Management unit 30 , Study no: 59

Type	Species	Nested Frequency					Average Cover %	
		'86	'87	'92	'98	'03	'98	'03
G	Agropyron cristatum	a-	b26	c80	c62	c75	2.00	3.90
G	Agropyron intermedium	a-	b45	c179	c191	c182	11.51	10.41
G	Agropyron smithii	-	-	-	4	-	.03	-
G	Bromus inermis	a-	a4	a4	b33	b39	1.17	1.63
G	Bromus tectorum (a)	-	-	-	b159	a113	6.13	4.65
G	Carex spp.	-	-	-	2	4	.15	.03
G	Dactylis glomerata	-	3	-	3	3	.15	.00
G	Festuca ovina	-	-	-	3	-	.03	-
G	Leucopoa kingii	-	2	-	-	-	-	-
G	Poa fendleriana	-	-	4	2	2	.09	.16
G	Sitanion hystrix	-	-	1	3	4	.06	.18
G	Sporobolus cryptandrus	a-	a-	a-	b23	a3	.84	.15
Total for Annual Grasses		0	0	0	159	113	6.13	4.65
Total for Perennial Grasses		0	80	268	326	312	16.06	16.47
Total for Grasses		0	80	268	485	425	22.20	21.13
F	Agoseris glauca	-	-	-	2	-	.03	-
F	Allium spp.	a-	a-	a-	b17	a-	.05	-
F	Artemisia dracunculus	a-	a-	a2	b25	a5	1.39	.52
F	Artemisia ludoviciana	-	-	4	7	1	.30	.00
F	Collomia linearis (a)	-	-	-	a2	b13	.01	.08
F	Collinsia parviflora (a)	-	-	-	-	4	-	.01
F	Crepis acuminata	-	-	3	1	5	.03	.09
F	Cryptantha spp.	-	-	-	4	-	.00	-
F	Delphinium nuttallianum	-	-	-	3	-	.00	.00
F	Descurainia pinnata (a)	-	-	-	-	-	-	.00
F	Dichelostemma pulchellum	a-	a-	a-	b12	a-	.05	-
F	Dracocephalum parviflorum	-	-	7	-	6	-	.45
F	Epilobium brachycarpum (a)	-	-	-	3	-	.00	-
F	Erodium cicutarium (a)	a-	ab5	a-	a-	b14	-	1.06
F	Erigeron spp.	a-	a-	a-	b14	ab4	.08	.01
F	Eriogonum racemosum	-	-	-	2	5	.03	.24

Type	Species	Nested Frequency					Average Cover %	
		'86	'87	'92	'98	'03	'98	'03
F	Gilia spp. (a)	-	-	-	$_{a}$3	$_{b}$31	.01	.24
F	Lappula occidentalis (a)	-	-	-	9	13	.04	.92
F	Lupinus argenteus	-	-	-	-	-	.03	-
F	Machaeranthera canescens	-	-	8	7	-	.04	-
F	Medicago sativa	$_{a}$-	$_{b}$74	$_{b}$85	$_{b}$71	$_{b}$63	10.00	4.27
F	Microsteris gracilis (a)	-	-	-	69	87	.42	2.49
F	Navarretia intertexta (a)	-	-	-	-	1	-	.00
F	Nicotiana attenuata (a)	-	2	-	-	-	-	-
F	Penstemon humilis	-	-	-	-	3	-	.03
F	Polygonum douglasii (a)	-	-	-	1	-	.00	.00
F	Senecio multilobatus	-	1	3	-	-	-	-
F	Sisymbrium altissimum (a)	-	-	-	-	1	-	.03
F	Sphaeralcea grossulariaefolia	$_{a}$4	$_{ab}$17	$_{bc}$29	$_{ab}$11	$_{c}$43	.37	.75
F	Taraxacum officinale	-	-	1	-	-	-	-
F	Tragopogon dubius	-	-	-	1	-	.00	-
F	Trifolium spp.	-	1	-	-	-	-	-
F	Unknown forb-annual (a)	-	4	-	-	-	-	-
F	Unknown forb-perennial	2	-	-	-	-	-	-
F	Verbascum thapsus	-	-	3	-	-	-	-
F	Viguiera multiflora	-	-	-	5	-	.18	-
Total for Annual Forbs		0	11	0	87	164	0.50	4.87
Total for Perennial Forbs		6	93	145	182	135	12.62	6.38
Total for Forbs		6	104	145	269	299	13.12	11.25

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 30 , Study no: 59

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Acer grandidentatum	0	1	-	-
B	Amelanchier utahensis	21	18	2.63	2.79
B	Arctostaphylos patula	0	0	-	.00
B	Artemisia tridentata vaseyana	1	1	.03	.15
B	Ceanothus greggii	9	8	2.13	2.47
B	Cercocarpus ledifolius	1	2	.15	.38

B	Clematis columbiana	2	1	-	-
B	Garrya flavescens	6	9	1.61	3.19
B	Opuntia spp.	1	1	.15	.15
B	Quercus gambelii	31	31	7.34	10.26
Total for Browse		72	72	14.05	19.40

CANOPY COVER, LINE INTERCEPT --
Management unit 30 , Study no: 59

Species	Percent Cover	
	'98	'03
Acer grandidentatum	1.60	.21
Amelanchier utahensis	-	4.63
Artemisia tridentata vaseyana	-	.10
Ceanothus greggii	-	3.70
Cercocarpus ledifolius	-	.30
Clematis columbiana	-	.16
Garrya flavescens	-	3.31
Opuntia spp.	-	.11
Quercus gambelii	2.40	15.36

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 30 , Study no: 59

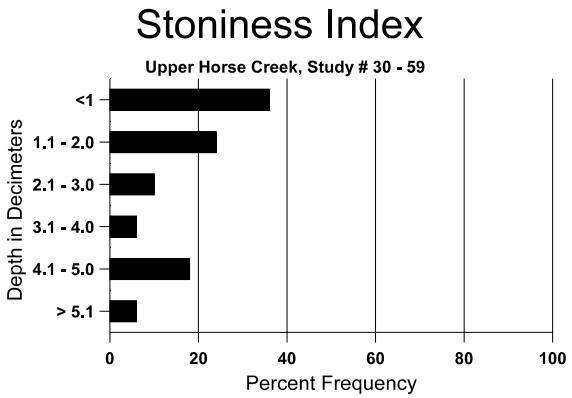
Species	Average leader growth (in)
	'03
Amelanchier utahensis	2.1

BASIC COVER --
Management unit 30 , Study no: 59

Cover Type	Average Cover %				
	'86	'87	'92	'98	'03
Vegetation	0	5.00	13.75	48.02	46.40
Rock	25.75	25.75	24.75	16.25	13.48
Pavement	5.00	4.00	1.75	.84	.12
Litter	50.00	20.75	48.25	57.31	55.57
Cryptogams	0	0	0	.04	0
Bare Ground	19.25	44.50	11.50	10.26	7.10

SOIL ANALYSIS DATA --
Management unit 30, Study no: 59, Study Name: Upper Horse Creek

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
18.5	45.3 (1998) (17.7)	6.0	72.0	17.4	10.6	2.1	16.2	86.4	0.5



PELLET GROUP DATA --
Management unit 30 , Study no: 59

Type	Quadrat Frequency '98	Quadrat Frequency '03
Deer	18	4

Days use per acre (ha) '98	Days use per acre (ha) '03
31 (77)	20 (50)

BROWSE CHARACTERISTICS --
Management unit 30 , Study no: 59

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Acer grandidentatum											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	136/142
03	**60**	-	60	-	-	-	0	0	-	0	-/-
Amelanchier utahensis											
86	**0**	2600	-	-	-	-	0	0	0	0	-/-
87	**4333**	400	4333	-	-	-	38	0	0	0	-/-
92	**1999**	-	766	1233	-	-	55	5	0	2	26/25
98	**560**	-	260	300	-	-	7	7	0	0	33/31
03	**540**	40	100	320	120	-	7	0	22	15	45/33

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Arctostaphylos patula											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**33**	-	33	-	-	-	0	100	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	22/45
03	**0**	-	-	-	-	-	0	0	-	0	38/61
Artemisia tridentata vaseyana											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**20**	-	-	20	-	60	0	0	-	0	22/39
03	**20**	-	-	20	-	-	0	0	-	0	34/49
Ceanothus greggii											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**600**	133	600	-	-	-	0	0	-	0	-/-
92	**566**	-	66	500	-	-	18	18	-	0	11/18
98	**180**	-	-	180	-	-	22	0	-	0	23/44
03	**180**	-	-	180	-	-	0	0	-	0	41/58
Cercocarpus ledifolius											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**66**	-	66	-	-	-	50	0	-	0	-/-
98	**40**	-	40	-	-	80	0	0	-	0	44/30
03	**40**	-	40	-	-	-	0	0	-	0	73/43
Clematis columbiana											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**60**	-	-	60	-	-	0	0	-	0	35/25
03	**20**	-	-	20	-	-	0	0	-	0	15/13
Garrya flavescens											
86	**0**	233	-	-	-	-	0	0	0	0	-/-
87	**266**	233	266	-	-	-	0	0	0	0	-/-
92	**233**	-	-	233	-	-	86	14	0	0	12/11
98	**220**	-	20	180	20	20	0	0	9	9	29/49
03	**240**	-	20	200	20	-	0	0	8	8	42/62

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Opuntia spp.											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**33**	-	33	-	-	-	0	0	-	0	-/-
92	**33**	-	-	33	-	-	0	0	-	100	7/13
98	**20**	-	-	20	-	-	0	0	-	0	8/12
03	**20**	-	-	20	-	-	0	0	-	0	13/19
Quercus gambelii											
86	**0**	1766	-	-	-	-	0	0	0	0	-/-
87	**833**	133	833	-	-	-	0	0	0	0	-/-
92	**166**	133	33	133	-	-	20	0	0	0	50/43
98	**2320**	-	620	1580	120	400	.86	0	5	4	44/45
03	**3340**	60	640	2480	220	580	1	0	7	3	45/29
Quercus gambelii-turbinella hybrid											
86	**0**	1733	-	-	-	-	0	0	-	0	-/-
87	**533**	33	533	-	-	-	0	0	-	0	-/-
92	**433**	-	33	400	-	-	8	0	-	0	63/47
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	-/-
Ribes spp.											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	59/46
03	**0**	-	-	-	-	-	0	0	-	0	-/-
Symphoricarpos oreophilus											
86	**0**	-	-	-	-	-	0	0	-	0	-/-
87	**0**	-	-	-	-	-	0	0	-	0	-/-
92	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	0	30/56
03	**0**	-	-	-	-	-	0	0	-	0	25/44